and moon may be so timed as to bring about great tides in certain parts of the ocean but none in other parts. The barometric waves, shown in Professor Henry's barograms in the REVIEW for July, 1899, seem to have been so timed as to produce and maintain unusual disturbances for a few hours in the surface of the water at Marquette, Mich. Tide gages both on the ocean shores and on the lakes, always show many rythmic oscillations depending on the many possible rates of oscillation of the water immediately surrounding the gage and the deep water off shore. It is generally difficult to trace these disturbances back to their ultimate origin. Sometimes a far distant earthquake shock starts a long slow wave that crosses the ocean and produces a regular series of gentle oscillations at the mouth of a harbor to which the tide gage within the harbor responds as best it can; at other times successive gusts of wind from some special direction are so timed as to set the waters of the harbor itself into rythmic motion. Any source of disturbance, no matter how slight, provided only that it come at the proper intervals, may set the ocean, the atmosphere, or the earth itself, into responsive oscillations.

Illustrations of the power of systematic well-timed impulses are familiar to every one who watches the mechanical operations going on about us. When half a dozen men wish to pull over a great tree, the rope is tied half way up; they set the tree into oscillation; they pull when the tree is coming toward them and cease pulling when it flies back, until finally a few oscillations of rapidly increasing extent bring the monarch low. A few men keeping step as they tramp across a bridge may soon set up dangerous oscillations until the iron rods and beams begin to snap. Two pendulum clocks standing beside each other on a shelf will often so influence each other, through the oscillations that are communicated to the supports, that the pendulums are forced to vibrate in unison. Musical instruments offer many illustrations of resonance due to well-timed rythmic vibrations.

LONG BALLOON VOYAGES.

It is well known that efforts to obtain continuous records at great altitudes for several days, in order to determine the diurnal variations of temperature, pressure, and wind, are great desiderata in meteorology, but are difficult to attain, because neither balloon nor kite can be kept at a uniform altitude for so long a period. The kite has, indeed, been kept in mid-air for two days, but its altitude varies to an important extent during that interval. The captive balloon can be held at a low altitude if the wind is not too strong; for high altitudes we must rely upon the free balloon manned by intelligent aeronauts, who shall so adjust the buoyant gas and the sand ballast as to maintain a fairly uniform altitude. The problem of a journey of several days' duration, at a uniform altitude, has been discussed with much care by Prof. S. A. King, the well-known aeronaut of Philadelphia, Pa., who has always maintained that it should be perfectly feasible for him to journey safely from America to Europe. Of course the expense of preparation has hitherto hindered him from making the attempt. We see by a recent dispatch from Berlin that the German aeronauts are arranging for an experimental trip of this kind about the middle of June. The main object will be to ascertain how long a balloon can be kept in mid-air, in spite of changes of temperature by day and night, which necessitate the ultimate loss of gas and ballast until, finally, the balloon must come to the earth. It is said that the present experimental balloon will contain 300,000 cubic feet of gas and the car will accommodate five persons, provisioned for ten days. These are about the same arrangements that were made for the famous ascension at Minneapolis, Minn., September 12, 1881, when Professor Upton accompanied Professor King, with every convenience for a long voyage. Professor Upton's account of this trip is given in the Annual Report of the Chief Signal Officer for 1882, pages 862–880. Unfortunately, the actual time of ascent was controlled by the authorities of a State fair, who had defrayed all the expenses, and although the balloon remained full of gas from September 12 to September 15, yet no extended journey was accomplished. Subsequent journeys with other balloons have been made by Professor King, with accompanying observers, but we believe the longest time that a balloon has been kept in the air during an actual journey in this country was about fourteen hours, in the aeronautic voyage of Mr. Wise from Buffalo toward New York, N. Y.

WIRELESS TELEGRAPHY.

A paragraph is being circulated in the press to the effect that the Weather Bureau is utilizing the piano wire that is used as kite strings in developing a new method of wireless telegraphy. This ingenious invention of the daily press has been seriously criticized by other newspapers, and it is perhaps worth while to say that the Weather Bureau has as yet done nothing of the kind. Our experience in the use of piano wire for kite string has, indeed, served to show that currents of atmospheric electricity are generally flowing along the wire with sufficient force to prevent its use for wireless telegraphy. In fact, there are so many obstacles to be overcome in the use of the ordinary Marconi system that it is hardly proper to speak of what has been done with other systems until the prospect of thoroughly useful practical results has become a certainty rather than a speculation. Meantime, however, it must be evident to all that the country expects the Weather Bureau to perfect some method of easy communication with vessels at sea, if in any way practicable, in order to warn them of storms and save life and property. We understand that some German steamers are already systematically using the Marconi system to announce their arrival and departure, but it may be easily seen that the great desideratum is a system of wireless telegraphy so simple that it shall commend itself to the use of all nations (like the Morse system of telegraphy and the Bell telephone), so that the same system may be used by all vessels that approach our shores.

STORMS OF SLEET.

We have before referred to the fact that owing to the great destructiveness of sleet in breaking down branches of trees and tender vegetation, telegraph wires, and even roofs of large buildings, it is desirable that there should be a special study of the sleet storms, their statistics, causes, and destructibility. In this connection we call attention to a short article by Hermann von Schrenk on the severe sleet storm of February 27, published in the Transactions of the Academy of Science at St. Louis, Vol. X, No. 5. Mr. von Schrenk gives some estimates and measurements of the amount of ice accumulating upon trees and other objects. Thus, in a storm of February, 1882, a cedar tree ten feet high, with its spreading branches, carried 400 pounds of ice. In a German storm a spruce tree three and a half feet high carried 165 pounds. In a French storm of 1879, described by Jamin, it is stated that a branch weighing 13 grams carried a load of 360 grams of ice. As to the storm of February 27, von Schrenk weighed about 200 branches of a variety of trees to determine what weights of ice the trees were able to withstand. The ratio of the weight of the smaller twigs to the ice incrusting them averaged about 15, but varied from 6 to 35. No estimate is